

ABSTRACT

A battery charging, discharging, and protection switch circuit with enhanced reverse voltage protection is achieved. The circuit comprises, first, field effect transistor (FET) switches having gate, source, drain, and bulk. The FET switches may comprise either NMOS devices or PMOS devices. Second, means of controlling the FET switch's gate and bulk are included. The FET switch gate voltage determines the OFF and ON state of said FET switches. The bulk is switchable coupled between the battery terminal and the load terminal. To achieve high voltage breakdown limits the FET switch is realized with cascaded MOSFETs, where as a novelty here under certain operating conditions, i.e. the battery charger coupled in reverse condition - one FET is working as a source follower. All the necessary MOSFET switches are integrated onto a single chip, together with its controller logic. To form these MOSFETs within a single IC together with the other circuit elements is much less expensive. The circuit of the invention is manufactured with CMOS deep well technology.